

Effects of Task Difficulty and Teacher Attention on the Off-Task Behavior of High-Ability Students With Behavior Issues

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This study used traditional behavioral assessment procedures (functional behavioral assessment and structural analysis) in a single-subject design to determine whether a functional relationship existed between (a) levels of task difficulty and teacher attention and (b) off-task behavior in 3 students identified as highly able in mathematics who also showed consistent behavior issues. Students' rates of off-task behavior were observed while working under varying conditions of task difficulty and teacher attention. Results indicated that higher rates of off-task behaviors were associated with low attention conditions. Task difficulty did not appear to have a consistent relationship with student behavior.

Students who demonstrate both high academic ability and consistent behavior problems have traditionally received limited attention in the research literature and in school programming (Morrison, 2001). Yet, such students are at risk for not receiving educational services to develop their potential. Recent increasing attention to the needs of special populations of gifted learners has included some focus on those with behavioral issues and the factors that may contribute to their educational experiences. Several studies have demonstrated that high-ability students with behavior problems may be at risk for not receiving appropriate

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educational services; teachers may question whether a high-ability child who also demonstrates problem behaviors “deserves” gifted services (Speirs Neumeister, Adams, Pierce, Cassady, & Dixon, 2007) and may avoid referring such a child for services (Bianco, 2005). A tendency among teachers to see atypical behaviors as more likely evidence of learning difficulties than of strengths may also limit the likelihood that students with behavioral issues will be recognized as needing gifted services (Baum & Olenchak, 2002). These tendencies, combined with the overall evidence of limited differentiation for gifted learners in classrooms (Latz, Speirs Neumeister, Adams, & Pierce, 2009; Moon, Brighton, & Callahan, 2003; Westberg, Archambault, Dobyns, & Salvin, 1993), suggest that gifted students with behavioral issues may receive few opportunities for appropriate academic challenges.

The empirical literature is limited regarding both the prevalence of and responses to gifted students who demonstrate problem behavior; therefore, despite an increasing body of literature addressing recommendations for meeting the needs of this population, there is little guidance from research to support specific interventions. For example, although differentiation based on academic readiness is a recommendation for reducing off-task behavior and increasing engagement among these learners (e.g., Seeley, 2003), specific evidence demonstrating direct linkage of more challenging tasks to behavior change has not been widely reported. Moreover, the methods that are used to examine behavior issues in other populations have not been widely or systematically applied in the gifted education field. This study represents an initial effort to bring together recommendations for gifted education practices with behavioral assessment and intervention approaches that have been empirically validated with other populations. The study examines task difficulty and teacher attention as potential variables in student behavior patterns. It employs single subject methodology, an experimental approach typically applied with a small number of participants, in which each participant serves as his or her own control, and behaviors are compared across different conditions over time.

Prior to developing behavioral supports or interventions for any student, educators should assess the function of student’s

behavior and the context in which it occurs (i.e., identify the antecedents and consequences that may occasion and maintain, respectively, the student's problem behavior). There are three main procedures that behavior analysts use to assess student behavior: functional behavioral assessment (FBA), structural analysis (SA), and functional analysis (FA). FBA is a descriptive assessment procedure that typically includes gathering information about the antecedents, consequences, and nature of a student's behavior using records reviews, interviews, and systematic direct observations. SA is an experimental procedure in which antecedent conditions (e.g., varying task difficulty, varying teacher attention) are systematically manipulated to explore the effect on student behavior. FA is an experimental procedure in which consequences (e.g., removing task materials, providing attention, providing access to items/activities) are systematically manipulated to explore the impact on student behavior (e.g., Crone & Horner, 2003; O'Neill et al., 1997; Wacker, Cooper, Peck, Derby, & Berg, 1999). There is a large body of empirical evidence supporting the use of FBA, SA, FA, or some combination of the three methods to assess the behavior of students with developmental disabilities (e.g., Kern, Gallagher, Starosta, Hickman, & George, 2006), emotional disturbance (e.g., Stage et al., 2008), and average ability (Roberts, Marshall, Nelson, & Albers, 2001). To date, no studies have been located that examined the utility of using similar assessment methods to assess behavior problems demonstrated by high-ability students.

This study is a systematic replication of Carr and Durand's (1985) structural analysis approach for identifying the function of problem behavior, which was also applied by Moore and Edwards (2003). Carr and Durand identified four students with developmental disabilities who exhibited problem behavior and implemented three assessment conditions (high attention/easy task, high attention/hard task, and low attention/easy task) in a pull-out classroom setting. They used a single subject design to document the relationship between those conditions and participant behavior. The researchers concluded that participants engaged in less problem behavior during high attention conditions, regardless of task difficulty. Moore and Edwards used four

conditions (a low attention/hard task condition was included with the three conditions used by Carr & Durand, 1985) to investigate the effect of various conditions on students with average ability and problem behaviors in a general education setting. They found that students engaged in higher levels of problem behaviors with (a) high attention, regardless of task difficulty (two students), and (b) hard tasks, especially when hard tasks were accompanied by high attention (two students).

One central principle of gifted education, and of the concept of differentiation in general, is the importance of providing learning opportunities that are challenging to students and appropriate for their level of cognitive development and learning readiness (e.g., Tomlinson, 2001). The implication is that such differentiated learning opportunities will promote both greater challenge and greater achievement among students because of the appropriate match to their learning needs. For gifted learners, this often involves the development of learning tasks that (a) incorporate advanced content, (b) present more complex demands, (c) require more in-depth investigation, or (d) include some combination of these strategies (VanTassel-Baska, 2003).

In the present study, researchers identified gifted or high-ability students who demonstrated problem behaviors and implemented four assessment conditions in a general education setting. The four conditions reflected those implemented by Moore and Edwards (2003), but the researchers hypothesized that within the gifted population, higher task difficulty might demonstrate a link to increased on-task behavior, in a distinction from previous populations studied. Specifically, this study addressed the following research question: Was there a functional relationship between (a) levels of task difficulty and teacher attention (independent variables) and (b) off-task behavior (dependent variable) for three high-ability students who also exhibited problematic behaviors?

Method

Participants

Middle school students were recruited to participate in this study on the basis of (a) high potential and/or achievement in the area of mathematics and (b) teacher reports that the student engaged in concerning levels of off-task and other problematic behaviors. Three students participated in this study: two sixth-grade males (Todd and Adam) and one eighth-grade male (Mitch).¹ Each student scored in the advanced range on state mathematics achievement tests over at least 2 years of testing; their scores over multiple years were also consistently above the average for their school and district. Each student participated in a different math class, taught by a different teacher, in the same public middle school in a Northeastern state. All classes were designated at honors level for the school.

After obtaining consent, researchers collected data to (a) confirm that the recruited students demonstrated off-task behavior (documented during baseline observations, which are presented in the results section) and (b) describe the context in which the off-task behaviors were likely to occur (documented during teacher interviews). Specifically, each student's teacher described the antecedents and consequences of the student's off-task behavior during a brief structured interview, which was conducted by researchers using the Functional Assessment Checklist for Teachers and Staff (FACTS; March et al., 2000). The following summary statements describe the students' off-task behaviors and the contexts in which they occurred.

- When Adam was assigned easier tasks during independent seatwork, he engaged in off-task behavior (e.g., staring into space) to *escape* the task.
- When Todd was given independent seatwork with peers present, he engaged in off-task behavior (e.g., talking to his peers) to *obtain* attention (and possibly to *escape* the task).

¹ Student names are pseudonyms.

- When Mitch was presented with independent seatwork, he engaged in disruptive off-task behavior (e.g., clicking, looking around, tapping, attempting to talk with peers/teacher) to *escape* the task (and possibly to *obtain* attention).

Thus, all students reportedly demonstrated off-task behavior that was occasioned and maintained by some feature of the task, the available attention, or both.

Design

A multi-element, or alternating treatments, design with a baseline phase was used to explore the relationship between off-task student behavior and two *antecedent* variables: teacher attention (high or low) and task difficulty (easy or hard) in honors-level math classes. A multi-element design is a single-subject experimental design in which two or more conditions are manipulated in rapidly alternating succession independent of the level of the target behavior. This allows researchers to compare the relative effect of various conditions on an individual's behavior (e.g., Richards, Taylor, Ramasamy, & Richards, 1999).

During the baseline phase, no changes were made to the students' classroom context (i.e., task difficulty and teacher attention were "typical" for that setting). During the alternating treatments phase, we systematically manipulated the level of teacher attention and task difficulty by placing students in four 5-min conditions each day: (a) high attention/hard task, (b) low attention/hard task, (c) high attention/easy task, and (d) low attention/easy task. We randomly alternated the order of conditions to control for sequencing effects. In other words, a structural analysis was performed to identify specific antecedent conditions associated with off-task behavior. Conditions are described in detail in the procedures section.

Dependent Measures

The following measures were used to collect data for each participating student. Note that the FACTS (March et al., 2000)

was administered once, at the beginning of the study, and direct observation data were collected repeatedly across time (during baseline and structural analysis phases).

FACTS. This checklist gathers information about students' problem behaviors (i.e., antecedents, consequences, and description) in a checklist format. The FACTS has "strong evidence of test-retest reliability and interobserver agreement, moderate to strong evidence of convergent validity with direct observation and functional analysis procedures, strong evidence of treatment utility, and strong evidence of social validity" (McIntosh et al., 2008, p. 33). In this study, the first author administered the FACTS as an interview.

Structured Direct Observations (SDO). Antecedent-Behavior-Consequence (ABC) data were taken using a 10-s partial-interval recording system to measure student behavior and record the antecedent and consequence events that may trigger and maintain student behavior. That is, observers recorded whether off-task or other behaviors occurred at any point during the 10-s interval, and they noted the events that preceded and followed student behavior(s) within the same interval. To ensure the reliability of the data, the following procedures were followed.

First, behavioral observers (three undergraduate teacher education students) were trained to collect data using 10-s partial-interval recording. Training consisted of (a) one meeting to introduce the partial interval recording form and discuss operational definitions of the behaviors included on the form and (b) two or more sessions of in-vivo training (i.e., observing children in the classroom) with the form. In-vivo training continued until the behavioral observers reached the predetermined criterion (i.e., 95%) of interrater reliability.

Throughout the project, interobserver agreement (IOA) checks were completed for 18% of behavior observations, which were spread throughout the duration of study and across students to prevent observer drift. IOA was calculated by summing the number of agreements (i.e., when both recorders indicated the presence/absence of each behavior within the 10-s interval) and divided by the sum of agreements and disagreements. The average IOA was 91.1% (range 89.2%–93.8%).

Procedure

Baseline data were collected for all students for a period of 6–12 days to document levels of off-task behavior. As stated, direct observation data were collected by trained observers using 10-s partial interval recording. Following baseline data collection, four 5-min conditions (easy task/high attention, hard task/high attention, easy task/low attention, and hard task/low attention) were administered each day, in a randomly selected order, in each student's math class. All students in each class completed the tasks to avoid drawing attention to the participants. Tasks were differentiated by modifying and adding problems to the teachers' existing curricular materials, with reference to participants' relevant pretest performance. Two sets of easier problems and two sets of harder problems were developed for each day's lesson. The problem sets were constructed by a professor in gifted education and a graduate student in secondary mathematics education, using key principles of differentiation (increasing or decreasing task complexity, the number of facets to be considered, and the level of abstraction; Tomlinson, 2001). Once developed, two other graduate students in mathematics and gifted education reviewed and classified the tasks as easier or harder as a validity check. Teacher attention was manipulated by asking a teacher to (a) sit by a student and give constant attention during high attention conditions and (b) not provide the student with any direct attention, unless necessary, during low attention conditions.

Data were collected to ensure the integrity of the four conditions; that is, to ensure that the conditions differed with respect to task difficulty and teacher attention. Task difficulty was documented by asking the three students to rate task difficulty on a scale of 1 (*easy*) to 4 (*hard*) and calculating the percent of correct completed responses. On average, during high attention conditions, students rated easy tasks 1.8 and achieved 99% correct; students rated hard tasks 2.1 and achieved 86% correct. On average, during low attention conditions, students rated easy tasks 1.6 and achieved 85% correct; students rated hard tasks 3.2 and achieved 74% correct. Thus, both in ratings and task performance, a clear distinction emerged between easy tasks with

high attention and hard tasks with low attention. The hard tasks with high attention received ratings more similar to the easy tasks than to the other hard tasks, and student performance on these tasks most resembled easy tasks with low attention.

Teacher attention was documented by observers, who noted the presence or absence of teacher attention during each observed interval and calculated percentages of intervals with teacher attention within each condition. During low attention conditions, teacher attention was delivered in 0.6% and 1.0% of intervals for easy and hard task conditions, respectively. During high attention conditions, teacher attention was delivered in 70.9% and 77.7% of intervals for easy and hard task conditions, respectively. Thus, two clear levels of teacher attention were created.

Data Analysis

Observation data collected using 10-s partial interval recording were summarized by counting the number of 10-s intervals with off-task behavior, dividing by the total number of intervals observed within the given condition, and multiplying by 100%. For example, in one 5-min condition (i.e., 30 10-s intervals), if off-task behaviors were recorded during 12 intervals, then 40% ($100 \times 12 / 50$) of intervals would be off task. The researchers graphed the percentages of intervals off task for each condition on each day. Then, they used visual analysis to examine changes in level, trend, and variability within and across phases. Visual analysis is a standard approach that allows researchers to evaluate the relationship between independent (intervention conditions) and dependent variables (student behavior) in analyzing data from experimental single subject research. We followed guidelines proposed by Horner and colleagues (2005) for determining the presence of a functional relationship. Specifically, a functional relationship was inferred if (a) clear separation was noted in *level* between baseline and intervention conditions across students (i.e., there was minimal or no overlap among the data paths associated with each condition); (b) data were *stable* (i.e., there was minimal or no noise in the data); and (c) *replication* of the effect was observed across at least three points in time.

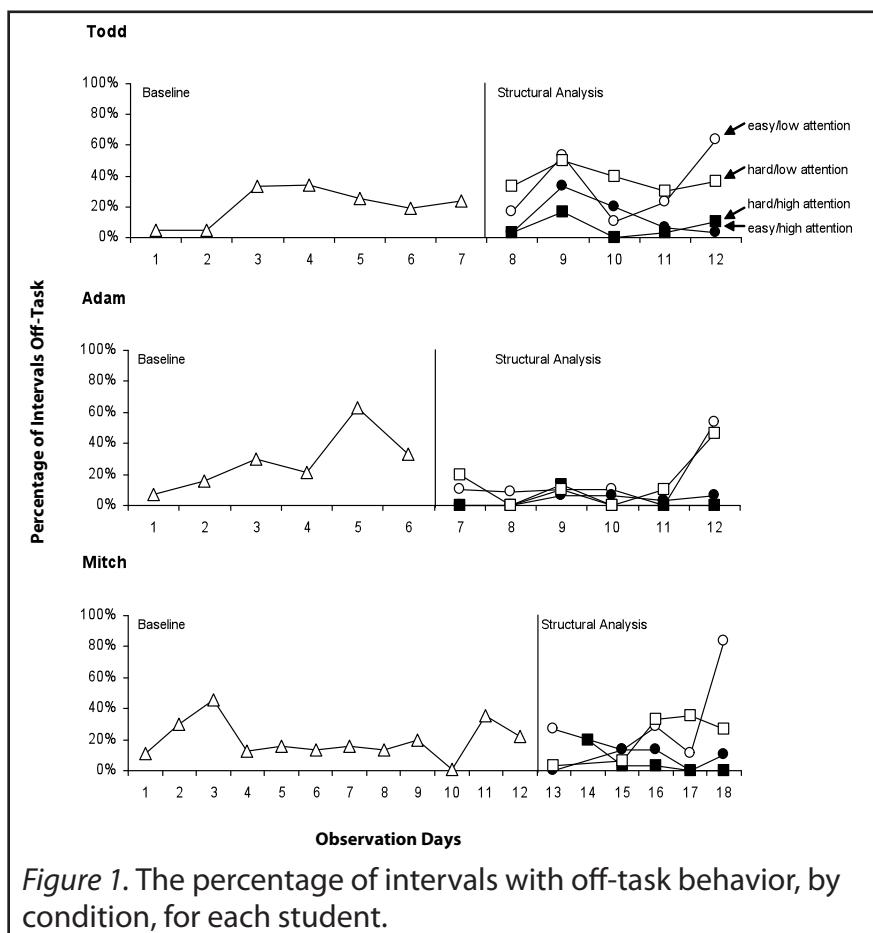


Figure 1. The percentage of intervals with off-task behavior, by condition, for each student.

Results

For all students, data patterns for off-task behavior were fairly stable during baseline, with a slight increase in trend for Adam and Todd throughout the baseline phase (see Figure 1). On average, Todd, Adam, and Mitch were off task during 20.7%, 33.3%, and 19.7% of intervals, respectively, across baseline observations. Upon the introduction of the four conditions (indicated by a vertical phase line in the figure), there was an immediate decrease in level, trend, and variability for Adam across all conditions relative to baseline; however, 100% of data points collected during the structural analysis phase overlap with those collected during the

Table 1

Mean (Median) Percentage of Intervals With Off-Task Behavior by Condition for Each Student

Student	Level of Task Difficulty	Attention Condition		
		High Attention	Low Attention	Overall
Todd	Easy	13.33 (6.67)	33.33 (23.33)	23.33 (18.33)
	Hard	6.67 (3.33)	38.00 (36.67)	22.33 (23.33)
	Overall	10.00 (5.00)	35.67 (35.00)	22.83 (18.33)
Adam	Easy	3.89 (5.00)	15.28 (10.00)	9.58 (6.67)
	Hard	2.22 (0.00)	14.44 (10.00)	8.33 (0.00)
	Overall	3.06 (0.00)	14.86 (10.00)	8.96 (6.67)
Mitch	Easy	7.33 (10.00)	32.52 (26.67)	19.93 (13.33)
	Hard	5.33 (3.33)	21.14 (26.67)	13.24 (5.00)
	Overall	6.33 (3.33)	26.83 (26.67)	16.58 (12.02)

baseline phase. For Todd and Mitch, there was not a clear change in level or trend across phases.

Within the structural analysis (multi-element) phase, the clearest differentiation between conditions was observed for Todd (see Figure 1). With the exception of one data point, there was clear separation between the data paths of high attention and low attention conditions; in contrast, the data paths for easy and hard conditions overlapped within attention conditions (i.e., easy/high attention overlapped with hard/high attention conditions, and easy/low attention overlapped with hard/low attention conditions). In other words, regardless of task difficulty, Todd exhibited the highest rates of off-task behavior during low attention conditions (see Table 1). Similarly, Adam and Mitch exhibited the highest rates of off-task behavior during low attention conditions (see Table 1). They exhibited slightly higher rates of off-task behavior when the task was easy than when the task was hard, especially within the high attention condition; however, the data paths associated with each condition for Adam and Mitch did not show clear separation (see Figure 1).

Discussion and Implications

Three male middle school students, who were identified as gifted or high-ability in math, participated in four 5-min assessment conditions (easy task/high attention, hard task/high attention, easy task/low attention, and hard task/low attention), which were presented in random order each day for a period of 5–6 days. A multi-element design was used to analyze the relationship between assessment condition and students' off-task behavior. In general, students exhibited more off-task behavior when they were receiving low levels of attention; the relationship between off-task behavior and task difficulty was less consistent.

These results are similar to those identified in previous research exploring the effects of varying adult attention and task difficulty for participants with more significant disabilities (Carr & Durand, 1985) and average ability (Moore & Edwards, 2003). All studies identified a relationship between student behavior and different levels of attention and task difficulty. The off-task behavior of students in the present study did not appear to be occasioned by hard tasks, unlike participants in the previous studies. In fact, two of the three students in this study may have been less likely to exhibit problem behaviors with hard tasks; this pattern was not detectable through visual analysis (i.e., there was not clear separation between data paths), but was reflected in averages by condition (see Table 1). Although these data should be interpreted with caution (given that the pattern was not obvious), they suggest that high-ability students may respond differently from learners of average or below-average ability, and further research is warranted. It is important to note that we would expect to see individual differences within the population of high-ability students, based on each student's learning history and the current context (i.e., environmental factors in the present setting that may occasion and reinforce the problem behavior).

There are several limitations that should be noted. First, the goal of any behavioral assessment should be to develop a technically correct and contextually appropriate behavior intervention plan. In this study, assessment data were collected at the end of the school year, and no intervention plans were

developed or evaluated. Although it appears that students' behavior was affected by different levels of teacher attention, the levels of teacher attention and task differentiation investigated in this study may exceed those used in typical intervention planning and the "usefulness" of this information in building intervention plans was not evaluated.

Second, because data were taken at the end of the school year, it is possible that observed student behavior may not have been representative of the rest of the school year. In fact, for both Adam and Mitch, the clearest separation occurred on the last day of observation.

Third, the design of the conditions may have created experimental confounds. Because the teacher was instructed to sit next to the student and give him "constant" attention during the high attention condition, proximity and attention were confounded. Thus, it may be appropriate to consider the high attention conditions "high attention with close proximity." Similarly, because the teacher was sitting next to the student while he was completing a task, it is possible that the teacher provided direct assistance to the student. As mentioned, data indicated that teacher attention did affect both student ratings of task difficulty and actual performance on the tasks. Future research should control for these potential confounds by ensuring clearer separation among conditions.

Fourth, although their behavior was noticeably off-task within their specific classroom environment and considered problematic by their teachers, the students referred to participate in this study did not demonstrate what would generally be considered high levels of off-task or disruptive behavior. Therefore, it would be inappropriate to generalize study results to other high-ability or gifted students who demonstrate more intense or frequent problem behaviors.

Fifth, as with many single subject studies, the small number of participants and the unique participant characteristics (male middle school students attending the same school) limit the external validity of this study. Thus, readers should use caution when generalizing study results across other participants and settings.

Finally, although the assessment conditions were run by the teachers, researchers developed and differentiated the tasks and conducted the direct observations. Thus, further research is necessary to determine if a school-based professional could perform the same assessment, without support, and would judge this to be a socially acceptable or valid method to identify the conditions associated with a student's problem behavior.

This study represented an initial exploration of the application of behavioral assessment procedures to high-ability students in their regular classroom setting, and the results suggest some implications for classrooms and directions for further study. The finding that teacher attention appears to bear an inverse relationship to problematic behavior is, perhaps, unsurprising; it is nevertheless important in light of the frequency with which highly able students may be given work to do independently when they are achieving at levels beyond the rest of their class. Further research into this pattern can provide support for arguments regarding the need for gifted students to receive specific attention from their teachers.

The results regarding task difficulty and behavior were less clear, yet suggested some support for the hypothesis that more challenging tasks may be more engaging to high-ability students and therefore may help to limit problematic behavior. This study also demonstrates that behavioral approaches such as structural analysis may be used to identify conditions associated with off-task behavior of high-ability students in a general education setting. Additional research is needed to identify if information gained during a structural analysis would lead to the development of more effective behavior intervention plans and if a school-based professional could perform the assessment and develop the plan without outside support.

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